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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO..
10/765,309	01/27/2004	Junji Nishii	10873.1394US01	9395
52835	7590	10/18/2006	EXAMINER	
HAMRE, SCHUMANN, MUELLER & LARSON, P.C. P.O. BOX 2902 MINNEAPOLIS, MN 55402-0902			STAHL, MICHAEL J	
		ART UNIT		PAPER NUMBER
				2874

DATE MAILED: 10/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/765,309	NISHII ET AL.	
Examiner	Art Unit		
Mike Stahl	2874		

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### **Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

1)  Responsive to communication(s) filed on 09 August 2006.

2a)  This action is **FINAL**.                            2b)  This action is non-final.

3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

4)  Claim(s) 1-25 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5)  Claim(s) \_\_\_\_\_ is/are allowed.

6)  Claim(s) 1-14 and 22-25 is/are rejected.

7)  Claim(s) 15-21 is/are objected to.

8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

9)  The specification is objected to by the Examiner.

10)  The drawing(s) filed on \_\_\_\_\_ is/are: a)  accepted or b)  objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)  The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a)  All    b)  Some \* c)  None of:  
1.  Certified copies of the priority documents have been received.  
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)  Notice of References Cited (PTO-892)  
2)  Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3)  Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_

4)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_

5)  Notice of Informal Patent Application

6)  Other: \_\_\_\_\_

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 7-8, 10-14, and 22-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Fournier et al. (US 5210801).

Claim 1: Fournier discloses an optical element (fig. 7c) comprising a structure having at least one convex portion and at least one concave portion formed so as to be adjacent to one of the convex portions, at least one surface of the structure being covered, the optical element having a hollow portion **26d**, wherein the at least one surface of the structure is covered with a covering layer **24** formed by a deposition process. The concave portion is devoid of the covering layer. Fournier teaches that the aspect ratio can be 2 or more (col. 6 lns. 39-42; claim 5). The fabrication process associated with fig. 7 is essentially an alternative to the process associated with fig. 2, but is more flexible in terms of appropriate deposition methods and is capable of producing lower aspect ratio cavities (col. 11 lns. 64-68). The upper limit of the range for cavity aspect ratio is considered to be the same as for the fig. 2 method.

Claim 2: The optical element further comprises a substrate **14**, wherein the structure is placed on the substrate.

Claim 3: The optical element further comprises a substrate **14** and a solid layer **16** stacked on the substrate, wherein the structure is placed on the solid layer.

Claim 4: In an extended embodiment (fig. 10), at least one of the convex portion and the concave portion is disposed so as to have a periodic structure.

Claim 5: At least one of the convex portion and the concave portion is disposed so as to have a one-dimensional periodic structure.

Claim 7: The fig. 7 embodiment has a convex portion with a multi-layered structure (i.e., it includes layers **18** and **24**).

Claim 8: The number of convex portions is one, and a plurality of concave portions are formed.

Claim 10: In the related fig. 8 embodiment, an optical component for controlling light is placed on the structure.

Claim 11: The optical component is an optical waveguide **52**.

Claim 12: The convex portion and the concave portion are arranged periodically in an alternate manner, and a depth of the concave portion is larger than half the width of the concave portion (col. 13 lns. 9-14). Fournier also teaches a range of values for the arrangement period of 0.3 to 3 microns (col. 13 lns. 15-20). A nominal operating wavelength of 800 nm is mentioned several times in the reference. Thus the disclosed grating period range corresponds to 0.375 to 3.75 times the operating wavelength and is entirely within the range recited by claim 12.

Claim 13: The depth of the concave portion may be more than twice the width of the concave portion (col. 6 lns. 39-42; claim 5).

Claim 14: As shown in fig. 7, the structure includes an upper cladding layer **24**, a lower cladding layer **16**, and a core layer **18** having a refractive index higher than those of the upper

cladding layer and the lower cladding layer, wherein the core layer is interposed between the upper cladding layer and the lower cladding layer, and the structure is placed in the core layer.

Claims 22-25: The process for fabricating the fig. 7 device meets the limitations of these claims.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fournier et al. (cited above).

Claim 6: Fournier does not disclose a two-dimensionally periodic structure. Official notice is taken of the fact that two-dimensionally periodic structures are well known in the art.

In particular, the prior art includes many instances of photonic crystals defined by a two-dimensionally periodic array of air holes within a solid layer. The benefits of Fournier's covering process with respect to one-dimensional arrays of air holes (see e.g. col. 2 lns. 10-28 and col. 3 lns. 12-17 and 26-36) are clearly applicable to two-dimensional arrays as well. Thus it would have been obvious to a skilled person to apply Fournier's teachings to a conventional two-dimensionally periodic air hole structure in order to achieve these benefits.

Claim 9: Fournier does not teach stacking a plurality of the optical elements according to claim 1. It would have been obvious to a skilled person to stack a number of the Fournier elements in order to conserve space on a supporting substrate.

***Response to Arguments (August 9, 2006 Remarks)***

The remarks regarding the Fournier et al. reference are noted. The amendment to claims 1 and 22 does distinguish over the fig. 2 embodiment of that reference. However, the fig. 7 embodiment is considered applicable to the amended claims as indicated in the revised rejection above.

The remarks regarding the Morgan et al. reference are persuasive to the extent that claims 1 and 22 were amended to recite an aspect ratio condition not disclosed or suggested by that reference. It is also not apparent that a skilled person would use the cavity formation process of Fournier to produce the Morgan device. The rejection based on Morgan in view of Fournier has been withdrawn.

***Allowable Subject Matter***

Claims 15-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The only reference applied to claim 15 in the previous Office action has been overcome as indicated above. The other prior art of record does not teach or suggest the optical circuit having all the elements of claim 15 and its parent claims. Claims 16-21 depend from claim 15.

***Conclusion***

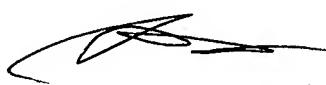
Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Inquiries about this letter should be directed to Mike Stahl at 571-272-2360. Inquiries of a general or clerical nature (e.g., a request for a missing form or paper, etc.) should be directed to the technical support staff supervisor at 571-272-1626. Official communications which are eligible for submission by facsimile and which pertain to this application may be faxed to 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mike Stahl MSS  
Patent Examiner  
Art Unit 2874

October 15, 2006

  
SUNG PAK  
PRIMARY EXAMINER